REMARKS

Reconsideration is respectfully requested. Claims 1- 19 are pending. Claims 1 -6, 18 and 19 are amended. New claims 20-37 are added. Claims 14-18 are withdrawn. No new matter has been added due to the amendments. Amendments to the claims do not affect inventorship.

Applicant has not dedicated or abandoned any unclaimed subject matter and moreover have not acquiesced to any rejections made by the Patent Office. Applicant reserves the right to pursue prosecution of any presently excluded claim embodiments in future continuation and/or divisional applications.

Claim Amendments

Claim 1 is amended. Support is found, for example, in paragraphs [020], [024], and [080]. Claim 2 is amended. Support is found, for example, in paragraphs [028] and [069]. Claim 4 is amended. Support is found, for example, in paragraph [071]. Claim 19 is amended. Support is found, for example, in paragraph [128]. Claims 1, 3, 18 and 19 are amended for technical clarity. Claims 3-6 are amended to correct dependency. New claims 20-37 are added. Support for the new claims are found, for example, in paragraphs [006], [020], [034], [043], [044], [046], and [073], and claims originally filed.

Title

The title is objected to because it is not descriptive.

Without acquiescing to the propriety of the objection, Applicant has amended the title. Entry of this new title is respectfully requested.

Objection to Specification

The specification is objected to because it contains embedded hyperlinks and/or other forms of browser-executable code, specifically page 37, line 29; page 39, line 2; page 40, lines 11-13, and page 41, lines 4-5, which are prohibited by M.P.E.P. § 608.01.

The specification has been amended to delete these hyperlinks and executable code. Applicant respectfully requests withdrawal of this objection.

Claim Objections

Claim 3 is objected to because of the following informality: the phrase "a least a" is grammatically incorrect. Claim 3 has been amended to correct the informality. As such, Applicant respectfully requests withdrawal of this objection.

Claims 4-13 are objected to under 37 C.F.R. § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from another multiple dependent claim. Claims 3-6 are amended to remove the multiple dependency. Applicant respectfully requests the withdrawal of this objection, and to examine claims 4-13 on the merit.

Applicant notes that these amendments are in response to objections, not rejections, and by definition are not made for reason related to patentability under Title 35 of the United States Code.

Claim Rejection under 35 U.S.C. § 101

Statutory subject matter rejection

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 101 on the basis that the claimed invention is directed to non-statutory subject matter. Applicant respectfully traverses.

Claim 1-3

To satisfy section 101 requirements, a method that does not result in a physical transformation of matter may be statutory where it recites a concrete, tangible and useful result. Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility (USPTO, 2005) ("Guidelines") at 19.

Claims 2-3 depend from claim 1, which as amended recites: "using a fitness function to determine which of said second hypothetical model best represents the system."

Assume, *arguendo*, claim1 does not result in a physical transformation of matter, it still produces a concrete, tangible and useful result because it requires "using a fitness function to determine which of said second hypothetical model best represents the system." As such claims 1-3 are directed to statutory subject matter and Applicant respectfully requests the rejection be withdrawn.

Claim 19

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. MPEP § 2106.

Claim 19, as amended, recites "[a] computer readable memory to direct a computer to function in a specified manner to derive and optimize a mathematical model for a system."

Applicant respectfully submits that claim 19 is directed to a patentable subject matter because it is directed to functional descriptive material (the modules) that is recorded on computer-readable medium. As such, claim 19 is directed to statutory subject matter and Applicant respectfully requests the rejection be withdrawn.

Patentable utility rejection

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 101 on the basis that the claimed invention lacks patentable utility. Applicant respectfully traverses.

In reviewing patent application for compliance with the utility requirement, the examiner must determine if the applicant has asserted a specific and substantial utility. If the applicant made such assertion, the examiner then needs to consider whether such assertions would be considered credible by a person of ordinary skill in the art. M.P.E.P § 2107.

A. There Is A Specific Utility For The Claimed Method and Apparatus.

A "specific utility" is specific to the subject matter claimed. This contrasts with a general utility that would be applicable to the broad class of the invention. M.P.E.P § 2107.01.

Claims 1-3, as amended, call for "[a] method to derive and optimize a mathematical model for a system." Claim 19, as amended, calls for "[a] computer readable memory to direct a computer to function in a specified manner to derive and optimize a mathematical model for a system."

Therefore, claims 1-3, and 19 are directed to a specific utility.

B. The Claimed Invention Has Substantial Utility .

A "substantial utility" defines a "real world" use. Any reasonable use that an applicant has identified for the invention that can be viewed as providing a public benefit should be accepted as sufficient, at least with regard to defining a "substantial" utility. M.P.E.P § 2107.01. To have a substantial utility an application must show that an invention is useful to the public. A "reasonable correlation" between the invention and the practical utility is sufficient. *Fujikawa v. Wattanasin*, 1565, 39 USPQ2d 1895, 1900 (Fed. Cir. 1996).

The present invention is directed to methods and apparatus to "derive and optimize a mathematical model for a system." Essentially, the invention is directed to a method of making a model that is then tested. As the Examiner acknowledges, models of biological systems are generally useful. The Applicants submit that methods that allow the generation of useful models are also useful. That is, the present invention allows the generation of a variety of different models, including biological models, models of traffic systems, weather models, financial models, etc.:

> The systems can be any scientific system, such as biochemical/physiological systems, weather systems, traffic systems, economic and financial systems, market analysis systems, etc.
> Paragraph [020].
>
> While the above discussion has focused on biological applications, as outlined herein, other systems can be evaluated and mathematical models generated. For example, in one embodiment, the unit operations are traffic related. The effects that can be modeled include this season/holidays variations, time of day, presence or absence of construction, the presence or absence of entertainment events such as sporting events or concerts, etc. Unit operations may include: traffic signals, intersections crosswalks or ramps, tunnels, bridges, highways, streets, parking structures, etc. The objects upon which the unit operations act may include, pedestrians, automobiles, trucks, trains, bicycles, etc.
>
> In another embodiment, the models are weather related, including models for seasons, temperature wind speed, precipitation, global warming or climate change, etc. Unit operations may include, thermal convection in air and water, solar radiation and absorption, evaporation, condensation, forced convection (the effects of wind and water), point sources of heating or cooling (icebergs, glaciers, volcanos, human activities).
> Paragraphs [130] to [132]

Accordingly, the invention is directed to the use of unit operations, AI algorithms and fitness functions to generate a useful mathematical model. As these models are useful, so are the methods of generating them.

Therefore, the instant application discloses both specific and substantial utilities and the rejection should be withdrawn.

Claim Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 112, first paragraph, on the basis that the claimed invention is not supported by either an asserted utility or a well-established utility so as one skilled in the art would not know how to use the claimed invention. Applicant respectfully traverses.

As presented above, the instant application discloses both specific and substantial utilities. As such, one skilled in the art would know how to use the claimed invention, and Applicant respectfully requests the rejection should be withdrawn.

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claim 1, and claims 2-3 depend therefrom, stand rejected for lack of clarity. Without acquiescing to the propriety of the rejection, Applicants has amended claim 1. As such, Applicant respectfully requests the rejection on this basis be withdrawn.

Claim 3 stand rejected on the basis of insufficient antecedent basis. Without acquiescing to the propriety of the rejection, Applicant has amended claim 3 to depend from claim 2. As such, Applicant respectfully requests the rejection on this basis be withdrawn.

Claim 19 stands rejected on the basis that claim 19 recites three modules and it is unclear how these modules are linked together. Without acquiescing to the propriety of the rejection, Applicant has amended claim 19 to add "and" between steps b) and c). As such, Applicant respectfully requests the rejection on this basis be withdrawn.

Claim 19 stands rejected on the basis that the recitation "to apply an artificial intelligent algorithm" lacks clarity. Without acquiescing to the propriety of the rejection, Applicant has amended claim 19 to recite "to apply an artificial intelligence algorithm to said first hypothetical model." As such, Applicant respectfully requests the rejection be withdrawn.

Claim 19 stands rejected on the basis that the recitation "to compare hypothetical models to at least a first set of empirical data" lacks clarity. Without acquiescing to the propriety of the rejection, Applicant has amended claim 19 to recite "to compare said first hypothetical model to at least a first set of empirical data." As such, Applicant respectfully requests the rejection be withdrawn.

Claim Rejection Under 35 U.S.C. § 102

Claims 1-3 and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Laurikkala et al. (*Computer Meths. Prog. Biomed.* 55:217-228 (1998) ("*Laurikkala*"). Applicant respectfully traverses.

For an anticipation rejection under 35 U.S.C. § 102 to be proper, a single reference must disclose each and every element of a claim. *In re Paulsen*, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994); M.P.E.P. § 2131 (citing *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The claimed invention is directed to method and apparatus "to derive and optimize a mathematical model for a system." Claim 2-3 depend from claim 1, which as amended, recites "a plurality of unit operations." Claim 19, as amended, recites "a unit operations module."

As the Examiner can appreciate, the term "unit operations" is a mathematical representation of a physical, chemical, or biochemical process or kinetic expression. "Unit operations" are not empirical measurements or clinical observations. The instant application discloses that:

> A plurality of unit operations represent the actions of the set of system components. By "plurality" herein is meant at least two. "Unit operations" or "physiological unit operations" (when the system is biological) are defined consistent with the definition common to chemical engineering [McCabe, W.L. and J.C. Smith, Unit Operations of Chemical Engineering, 3rd edition (McGraw-Hill, NY, 1976)]. Although the number of individual process systems is great, each one can be broken down into a series of steps, called operations, each operation appearing in many process systems. Each individual operation has common techniques and is based on the same scientific principles. By defining these principles and incorporating them into a common mathematical representation the individual operation becomes a unit operation.
> Paragraph [034].

The instant application also discloses that "the physiological unit operations represent a set of biochemicals that share one mathematical model that can be expressed via an equation or set of equations; the physiological unit operation is the mathematical model." Paragraph [023].

In contrast, *Laurikkala* discloses a rules-based systems driven by empirical measurements. It is a general purpose learning system that uses a genetic algorithm to discover the rules for an expert system from a database. See Abstract. There is no mention in *Laurikkala* of any role for a mathematical representation of a system such as a differential equation or difference equation model.

Thefeore, *Laurikkala* does not teach " a plurality of unit operations" as claim 1 recites, or "a unit operations module" as claim 19 recites.

Because *Laurikkala* does not teach each and every limitation of claim 1 and 19, it does not anticipate claims 1-3 and 9. Applicant respectfully requires the rejection on this basis be withdrawn.

CONCLUSION

Applicant requests review on the merit of Claims 4-13. Applicant additionally requests reconsideration of Claims 1-3 and 19 in light of the foregoing remarks. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (415) 781-1989.

Respectfully submitted,
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Dated: 11/21/06

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